

ORIGINAL RESEARCH

Assessment of association between maternal HbA1c and adverse outcomes in gestational diabetes

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ABSTRACT

Background: Any glucose intolerance that appears or is initially diagnosed during pregnancy is known as gestational diabetes mellitus, or GDM. The present study was conducted to evaluate HbA1c levels and its correlation with the pregnancy outcome. **Materials & Methods:** 80 pregnant women with gestational diabetes mellitus (Group I) had >5.8% HbA1c level and 80 subjects (group II) (control) had <5.8% HbA1c level. Pregnancy outcomes were compared in relation to HbA1c values. **Results:** The age group 21-25 years had 36 in group I and 40 in group II, age group 26-30 years had 34 in group I and 26 in group II and >30 years had 10 in group I and 14 in group II. BMI was 18-25kg/m² seen in 40 in group I and 32 in group II, 26-30kg/m² in 32 in group I and 36 in group II and >30kg/m² was seen in 8 in group I and 12 in group II. The difference was non-significant (P>0.05). UTI was seen in 6 in group I and 3 in group II, vulvo vaginal infections in 7 in group I and 4 in group II, pre-eclampsia was seen in 10 in group I and 2 in group II, polyhydramnios in 5 in group I and 1 in group II, preterm labour in 4 in group I and 8 in group II, postpartum haemorrhage in 2 in group I and 1 in group II and caesarean deliveries in 21 in group I and 17 in group II. The difference was significant (P<0.05). **Conclusion:** Pre-eclampsia, polyhydramnios, preterm labor, UTI, vulvo vaginal infections, postpartum hemorrhage, and cesarean births were highly prevalent in individuals with gestational diabetes mellitus.

Key words: gestational diabetes mellitus, glycosylated hemoglobin, UTI

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INTRODUCTION

Any glucose intolerance that appears or is initially diagnosed during pregnancy is known as gestational diabetes mellitus, or GDM. The American Diabetes Association recently defined it as diabetes that is not obviously overt yet is diagnosed during pregnancy.^{1,2} According to this description, there may be two different types of gestational diabetes mellitus (GDM): one that is founded on a pregestational metabolic disorder and the other that results from a disrupted metabolic adaptation to pregnancy's energy needs under conditions of significant physiological insulin resistance. There is still a lack of international agreement on GDM screening despite enormous effort and research.³

Glycated hemoglobin (HbA1c) has been widely accepted as an indicator used to evaluate the blood glucose control in diabetes mellitus (DM) patients. However, evidence on the application of HbA1c in the diagnosis and follow up of gestational diabetes mellitus (GDM) and pregnancy combined DM is very poor.⁴ In non-pregnant women, the HbA1c is 4.7-

6.3%. However, in pregnant women, the HbA1c might be lower than that in healthy controls because pregnant women are younger and the fasting blood glucose increases over age. Thus, relatively older, healthy non-pregnant women may have high HbA1c; the lifespan of red blood cells reduces in pregnant women (including those with diabetes mellitus [DM]), resulting in reduction in HbA1c.^{5,6} The present study was conducted to evaluate HbA1c levels and its correlation with the pregnancy outcome.

MATERIALS & METHODS

The present study consisted of 80 pregnant women with gestational diabetes mellitus. The written consent was obtained from all selected patients.

Data such as name, age etc. was recorded. Patients were divided into 2 groups. Group I had >5.8% HbA1c level and group II had <5.8% HbA1c level (control). 5 ml of venous blood was obtained from all enrolled patients and measurement of HbA1c level with latex agglutination inhibition assay method was performed. Pregnancy outcomes were compared

in patients with GDM in relation to HbA1c values. analysis. P value < 0.05 was considered significant. Data thus obtained were subjected to statistical

RESULTS

Table I Demographic data

Parameters	Variables	Group I	Group II	P value
Age (years)	21-25	36	40	0.12
	26-30	34	26	
	>30	10	14	
BMI (kg/m ²)	18-25	40	32	0.74
	26-30	32	36	
	>30	8	12	

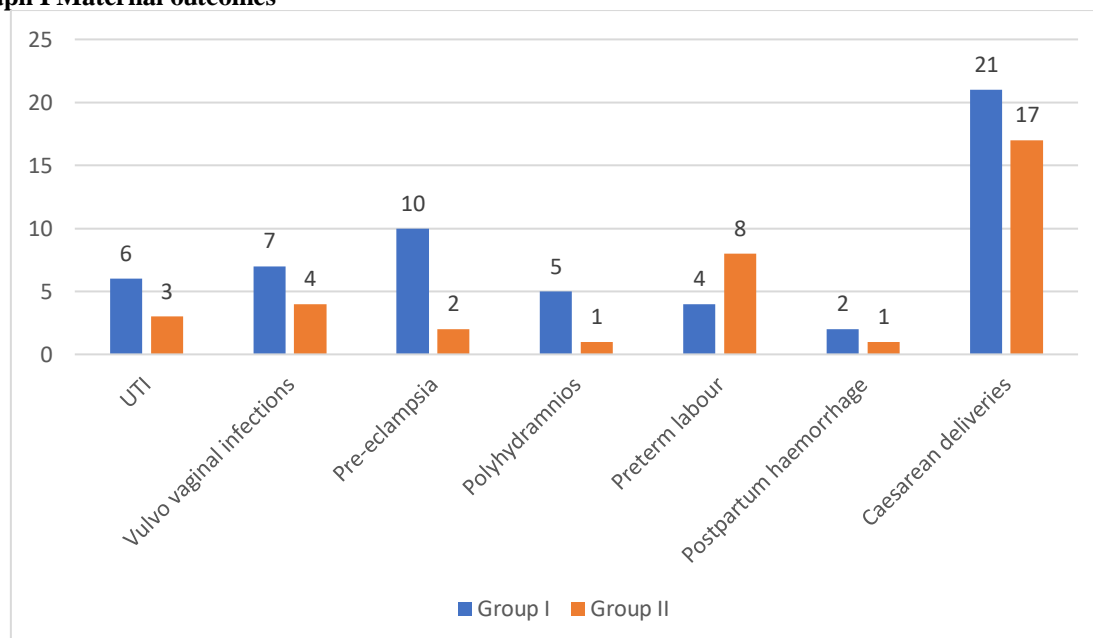
Table I shows that age group 21-25 years had 36 in group I and 40 in group II, age group 26-30 years had 34 in group I and 26 in group II and >30 years had 10 in group I and 14 in group II. BMI was 18-25 kg/m² seen in 40 in group I and 32 in group II, 26-30 kg/m² in 32 in group I and 36 in group II and >30 kg/m² was seen in 8 in group I and 12 in group II. The difference was non-significant (P>0.05).

Table II Maternal outcomes

Variables	Group I	Group II	P value
UTI	6	3	0.04
Vulvo vaginal infections	7	4	0.05
Pre-eclampsia	10	2	0.01
Polyhydramnios	5	1	0.03
Preterm labour	4	8	0.05
Postpartum haemorrhage	2	1	0.16
Caesarean deliveries	21	17	0.83

Table II, graph I shows that UTI was seen in 6 in group I and 3 in group II, vulvo vaginal infections in 7 in group I and 4 in group II, pre-eclampsia was seen in 10 in group I and 2 in group II, polyhydramnios in 5 in group I and 1 in group II, preterm labour in 4 in group I and 8 in group II, postpartum haemorrhage in 2 in group I and 1 in group II and caesarean deliveries in 21 in group I and 17 in group II. The difference was significant (P<0.05).

Graph I Maternal outcomes



DISCUSSION

Diabetes is the most common pre-existing medical condition complicating pregnancy in the United Kingdom (approximately four occurrences per 1000 pregnancies).⁷ It is known to have a substantial impact

on maternal, fetal and neonatal outcomes. The presence of diabetes is said to increase the risk of congenital malformation (10-fold), the risk of stillbirth (5-fold), and the risk of neonatal death (by 3-fold).⁸

The increased HbA1c is close associated with complications of pregnant women with DM and detection of HbA1c is important for the monitoring of acute and chronic complications (such as macrosomia, birth defects, stillbirth and preeclampsia, etc).⁹ In women with pre-existing diabetes before conception are attempted, HbA1c target below 6.1% is recommended by National Institute for Health and Clinical Excellence (NICE), < 7% by American Diabetes Association (ADA). Women with diabetes whose HbA1c is above 10% should be strongly advised to avoid pregnancy. Studies show that poor glycemic control in early pregnancy is associated with an increased risk of CHD in offspring. In type 1 or type 2 diabetes patients with the worst control (HbA1c > 8.5%), the risk of CHD increases dramatically, more than 10 times higher than the background.^{10,11} The present study was conducted to evaluate HbA1c levels and its correlation with the pregnancy outcome.

We found that age group 21-25 years had 36 in group I and 40 in group II, age group 26-30 years had 34 in group I and 26 in group II and >30 years had 10 in group I and 14 in group II. BMI was 18-25kg/m² seen in 40 in group I and 32 in group II, 26-30kg/m² in 32 in group I and 36 in group II and >30kg/m² was seen in 8 in group I and 12 in group II. Valadan et al¹² in their study found that of 700 participants, one hundred and fifteen (16.4%) women had GDM. The GDM patients were significantly older and had a higher pre-gestational body mass index and pregnancy weight gain compared to the non-GDM participants. The sensitivity and specificity for ruling out GDM at an HbA1c cut-of value of 4.85% was 92.2 and 32.8%, respectively, with a 95.5% NPV and a 21.2% PPV. Furthermore, sensitivity and specificity for diagnosing GDM at an HbA1c cut-of value of 5.45% was 54.8 and 96.8%, respectively, with a 91.5% NPV and a 76.8% PPV. Using HbA1c could decline OGTT in 40.4% of the pregnant women (28.7% with HbA1c

We observed that UTI was seen in 6 in group I and 3 in group II, vulvo vaginal infections in 7 in group I and 4 in group II, pre-eclampsia was seen in 10 in group I and 2 in group II, polyhydramnios in 5 in group I and 1 in group II, preterm labour in 4 in group I and 8 in group II, postpartum haemorrhage in 2 in group I and 1 in group II and caesarean deliveries in 21 in group I and 17 in group II. In a study on the perinatal outcome of pregnant women with type I diabetes, Nielsen et al¹³ categorized the outcomes as either poor (severe congenital abnormalities identified within a month of birth, stillbirth, spontaneous abortion, therapeutic abortion, or neonatal death) or good (neonates surviving for at least one month and having no severe congenital abnormalities). The results showed that 12% of patients had a HbA1c below 7.2% and 79% had a HbA1c above 10.3%. The poor result was correlated with HbA1c > 7% in a roughly linear fashion. A 1% increase in HbA1c raised the probability of a negative result by 5.5%.

Furthermore, there was no consistent correlation seen between HbA1c < 7% and the result.

Amylidi-Mohr S et al¹⁴ included 785 cases with complete dataset. The prevalence of GDM was 14.7% (115/785). Those who developed GDM had significantly higher HbA1c and random plasma glucose values ($p < 0.0001$ and $p = 0.0002$, respectively). In addition, they had a higher body mass index, were more likely to have a history of GDM and/or a first-degree family history of diabetes. When these maternal characteristics were combined with the first-trimester HbA1c and random plasma glucose the combined area under the receiver operating characteristics curve was 0.76.

CONCLUSION

Authors found that Pre-eclampsia, polyhydramnios, preterm labor, UTI, vulvo vaginal infections, postpartum hemorrhage, and cesarean births were highly prevalent in individuals with gestational diabetes mellitus.

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